

# GLOSSARY



## Glossary

**ALARA:**

As Low As Reasonably Achievable; refers to the EPA recommended allowable dose.

**Absorbed Dose:**

The energy imparted to matter by ionizing radiation per unit of irradiated material at the place of interest. The unit of absorbed dose is the radiation of absorbed dose (rad).

**Activity:**

The number of nuclear transformations occurring in a given quantity of material per unit time.

**Alpha Particle:**

A charged particle emitted from the nucleus of an atom having a mass and charge equal in magnitude to that of a helium nucleus; i.e., two protons and two neutrons.

**Atom:**

The smallest particle of an element which cannot be divided or broken up by chemical means. It consists of a central core called the **nucleus**, which contains protons and neutrons. Electrons revolve in orbits around the nucleus.

**Atomic Number:**

The number of protons in the nucleus of an atom.

**Background Radiation:**

The radiation in man's natural environment, including cosmic rays and radiation from the naturally radioactive elements, both outside and inside the bodies of humans and animals. It is also called natural radiation. Man-made sources of radioactivity contribute to total background radiation levels. Approximately 90 percent of background radiation from man-made sources is related to the use of ionizing radiation in medicine and dentistry.

**Becquerel (Bq):**

The SI unit of activity. One becquerel is one decay per second.

**Beta Particle:**

An electron emitted from the nucleus of an atom with the mass of an electron and a charge of either minus one or plus one.

**Bioassay:**

The collection and analysis of human hair, tissue, nasal smears, urine or fecal samples to determine the amount of radioactive material that might have been ingested by the body.

**Biological Half-Life:**

The time required for the body to eliminate by biological processes one-half of the amount of a substance which has entered it.

**Byproduct Material:**

Any radioactive material (except special nuclear material) that became radioactive by exposure to the radiation produced in the process of utilizing special nuclear material.

**CFR:**

Code of Federal Regulations.

**Charged Particle:**

An ion; an elementary particle that carries a positive or negative electrical charge.

**Counter, Geiger-Mueller:**

Highly sensitive, gas-filled radiation-measuring device.

**Curie:**

The traditional measuring unit used to describe the amount of radioactivity in a sample of material. One curie is equal to 37 billion disintegrations per second.

**DOT:**

Department Of Transportation.

**Decay, Radioactive:**

Disintegration of the nucleus of unstable atoms by spontaneous emission of charged particles, electromagnetic radiation, or both.

**Decontamination:**

The reduction or removal of contaminating radioactive material from a structure, area, object, or person.

**Dose:**

A general term for denoting the quantity of radiation or energy absorbed. If unqualified, it refers to absorbed dose.

**Dose Equivalent:**

The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest.

**Dose Rate:**

The **absorbed dose** delivered per unit time. It is usually expressed as rads per hour, or in multiples or submultiples of this unit, such as millirads per hour. The dose rate is commonly used to indicate the level of hazard from a radioactive source.

**Dosimeter:**

Any instrument used to detect and measure radiation exposure.

**Encapsulated Source:**

A radionuclide sealed in a container such as a tube or needle. Also called a **sealed source**.

**Film Badge:**

A dosimeter based on a pack of photographic film which measures radiation exposure.

**Gamma Ray:**

Electromagnetic radiation of nuclear origin with wavelength shorter than that of visible light; identical to x-rays except in how they originate.

**Gray (Gy):**

A special name for a unit of absorbed dose and the energy it imparts. The SI unit of absorbed dose equal to 1 Joule/kilogram.

**Health Physics:**

The science concerned with recognition, evaluation, and control of health hazards from ionizing and non-ionizing radiation, and record keeping.

**IAEA:**

International Atomic Energy Agency.

**Inverse Square Law:**

The relationship which states that gamma radiation intensity is inversely proportional to the square of the distance from a point source.

**Ion:**

Atomic particle, atom, or chemical radical bearing an electrical charge, either negative or positive.

**Ionizing Radiation:**

Any radiation capable of displacing electrons from atoms or molecules, thereby producing ions, such as alpha, beta, gamma and X-rays.

**Irradiation:**

Exposure to ionizing radiation.

**Isotopes:**

Nuclides having the same number of protons and hence the same atomic number, but differing in the number of neutrons, and therefore in the mass number. Isotopes have almost identical chemical properties.

**Laser:**

Initials come from Light Amplification by Stimulated Emission of Radiation. The laser is a device that emits highly focused, single frequency electromagnetic radiation.

**Leak Test:**

A radiation/contamination survey of a sealed source.

**MPC:**

Maximum Permissible Concentration.

**Monitoring:**

Periodic or continuous determination of the amount of ionizing radiation or radioactive contamination present for purposes of health protection. Also referred to as "surveying."

**NORM:**

Naturally Occurring Radioactive Material.

**NRC:**

Nuclear Regulatory Commission.

**Neutron:**

An uncharged elementary particle with a mass slightly greater than that of the proton, and found in the nucleus of every atom heavier than the lightest isotope of hydrogen.

**Nuclide:**

A type of atom characterized by the constitution of its nucleus. The nuclear constitution is the number of protons, number of neutrons, and energy content; it can also be characterized by atomic number and atomic mass.

**Nucleus, Atomic:**

The small, positively charged core of an atom. It is only about 1/100,000 diameter of the atom but contains nearly all the atom's mass. All nuclei contain both protons and neutrons, except the nucleus of ordinary hydrogen, which consists of a single proton.

**Photon:**

A gamma or x-ray.

**RSC:**

Radiation Safety Committee.

**RSO:**

Radiation Safety Officer.

**Rad:**

**Radiation Absorbed Dose.** A rad is the unit of absorbed dose. The rad is a measure of the energy imparted to matter by ionizing particles per unit mass of irradiated materials at the place of interest. A rad is approximately equal to the absorbed dose in tissue when the exposure in air is one roentgen (R).

**Radiation:**

(1) The emission and propagation of energy through space or through a material medium in the form of waves such as electromagnetic or sound waves.

(2) Emissions, such as alpha and beta radiation, or rays of mixed or unknown type, such as cosmic radiation.

(3) The energy released during atomic or nuclear transitions between different energy states.

**Radioactive Decay:**

Disintegration of the nucleus of an unstable nuclide by the spontaneous emission of charged particles, neutrons, and/or photons.

**Radioactive Half-Life:**

The time required for a radioactive substance to lose fifty percent of its activity by decay.

**Radioactivity:**

The tendency of certain nuclides to spontaneously undergo a nuclear transformation, emitting ionizing radiation in the process.

**Radioisotope:**

An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. Approximately 5,000 natural and artificial radioisotopes have been identified.

**Rem:**

**Roentgen Equivalent Man**— a special unit of radiation dose equivalent. The dose equivalent in rems is numerically equal to the absorbed dose multiplied by the factor (Q), the distribution factor, and any necessary modifying factors.

**Roentgen:**

The unit of exposure from x- or gamma rays.

**Sealed Source:**

A radioactive source sealed in an impervious container which has sufficient mechanical strength to prevent contact with and dispersion of the radioactive material under the conditions of use and wear for which it was designed.

**Shield:**

Material used to prevent or reduce the passage of radiation. A shield may be designated according to what it is intended to absorb (as a gamma-ray shield or neutron shield), or according to the kind of protection it is intended to give (as a background, biological, or thermal shield).

**Sievert (Sv):**

The SI unit of dose equivalent to 1 Joule/kilogram.

**Source Material:**

Uranium or thorium, or any combination thereof, in any physical or chemical form.

**Special Nuclear Material:**

Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235.

**Specific Activity:**

Total activity of a given radionuclide per unit mass or volume.

**Survey:**

An evaluation of the radiation hazards under a specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive materials.

**Survey Instrument:**

A portable instrument used for detecting and measuring radiation under varied physical conditions. The term covers a wide range of devices.

**Système International (SI):**

A system of units adopted by the 11th General Conference on Weights and Measurements in 1960 and used in most countries of the world.

**Transport Index:**

The number placed on a radioactive materials package label that indicates the control required during transport. The transport index is the radiation level, in millirems per hour, at three feet from the accessible external package surface; or, for fissile Class II packages, an assigned value based on criticality safety requirements for the package contents.

**Tritium:**

The hydrogen isotope with one proton and two neutrons in the nucleus.

**X Rays:**

Electromagnetic radiations with wave lengths shorter than that of visible light.

